The demography of invasion: Tephritids of La Reunion, a unique model to study invasion and competition

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Abstract :

Despite quarantine procedures, many invasions of polyphagous fruit flies (family Tephritidae) have been observed in various parts of the world. These invasions usually result in decreased numbers of, and niche shifts by, established species, be they indigenous or previous invaders. In this study we compare four species of this family: three successive invaders and one endemic species of La Réunion Island with respect to demographic parameters, experimental co-infestations on the same fruit and behavioural interference.

The results suggest an interspecific trade-off between K and r traits. Larval competition has a negative effect on pupal weight and larval survival. In behavioural trials, some adult females are able to drive out other females from a fruit. The asymmetry of larval competition and direct interactions among females seems to be correlated with the temporal rank of establishment on the island, the species arrived more recently showing a high performance in larval competition and in driving out other females from the fruit.

In optimal conditions, the r-K gradient could be used as a predictor of potential invaders because K-traits may favour both exploitation and interference competition. However coexistence among species is allowed because of the variability in tolerance to climatic conditions (temperature and humidity) and host-plants range. However, the endemic species has lower fecundity and survival parameters than the other species, and moreover has both the climatic and resource axes of its niche included in those of other competing species. We predict the stable coexistence among the three invasive species while the extinction of the endemic species may occur.